NEMIC-LAMBDA LTD.
KARMIEL INDUSTRIAL ZONE, POB 500, ZC-20101, ISRAEL.
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DECLARATION OF CONFORMITY

We Nemic-Lambda Ltd., located at Karmiel Industrial zone, Israel, declare under our sole responsibility that the product:

Product Name: GPIB-RS485 Controller

Model: GP485A rated 100-240Vac

Conforms to the following product specifications:

Safety: EN61010-1 :2001 (2nd Edition)

Electromagnetic Emissions:

EN 61326:1997 A1:1998
EN 61362:1997 A2:2001
EN 61326:1997 A3:2003
CISPR 11:1997, Class B, A1:1999
CISPR 11:1997, Class B, A2:2002

IEC 61000-4-2 : 1995	AD: 8KV, CD:4KV
IEC 61000-4-3 : 1995	(80-1000 Mhz), 1V/m 80% A.M. by 1kHz
IEC61000-4-6 : 1996	(0.15-80MHz) 3VRMS, 80% A.M. by 1kHz Power and Signal lines

The product herewith complies with the requirements of the Low Voltage Directive 73/23/EEC as amended by 93/68/EEC, and the EMC directive 89/336/EEC, as amended by 92/31/EEC and 93/68/EEC for Electrical Equipment used in Information Technology environments, and carries the CE mark accordingly.
Our authorized representative in the EU is Coutant Lambda Limited, located at Kingsley Avenue, Ilfracombe, Devon EX34 8ES, UK. Further, all products covered by this declaration are manufactured by processes which ensure continued compliance of the products with the requirements of the Low Voltage and the EMC directives.

Name of Authorized Signatory:	Martin Southam
Signature of Authorized Signatory:	
Position of Authorized Signatory:	Director of Marketing, Coutant Lambda
Date:	30/10/06
Place where signed:	Ilfracombe, UK

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WARRANTY

This Nemic-Lambda product is warranted against defects in materials and workmanship for a period of three years from date of shipment. During the warranty period, Nemic-Lambda will, at it's option, either repair or replace products which prove to be defective.

LIMITATION OF WARRANTY

The warranty shall not apply to defects resulting from improper or inadequate usage or maintenance by the buyer, buyer supplied products or interfacing. The warranty shall not apply to defects resulting from unauthorized modifications or from operation exceeding the environmental specifications of the product.

Nemic-Lambda does not warrant the buyers circuitry or malfunctions of Nemic-Lambda products resulting from the buyer's circuitry. Furthermore, Nemic-Lambda does not warrant any damage occurring as a result of the buyer's circuitry or the buyer's - supplied products.

No other warranty is expressed or implied.

WARRANTY SERVICE

This product must be returned to an authorized Nemic-Lambda service facility for repairs or other warranty service. For products returned to Nemic-Lambda for warranty service, the buyer shall prepay shipping charges to Nemic-Lambda and Nemic-Lambda shall pay the shipping charges to return the product to the buyer.

DISCLAIMER

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TRADEMARK INFORMATION

Microsoft™ and Windows™ are trademarks of Microsoft Corporation.

SAFETY INSTRUCTIONS

CAUTION

The following safety precaution must be observed during all phases of operation, service and repair of this equipment. Failure to comply with the safety precautions or warnings in this document violates safety standards of design, manufacture and intended use of this equipment and may impair the built-in protections within.
Nemic-Lambda shall not be liable for user's failure to comply with these requirements.

INSTALLATION CATEGORY

The GP485A Series has been evaluated to INSTALLATION CATEGORY II. Installation Category (over voltage category) II: local level, appliances, portable equipment etc.. With smaller transient over voltages than Installation Category (over voltage category) III.

GROUNDING

This product is a Safety Class 1 instrument. To minimize shock hazard, the instrument chassis must be connected to an electrical ground. The instrument must be connected to the AC power supply mains through a three conductor power cable, with the ground wire firmly connected to an electrical ground (safety ground) at the power outlet.
For instruments designed to be hard - wired to the supply mains, the protective earth terminal must be connected to the safety electrical ground before an other connection is made. Any interruption of the protective ground conductor, or disconnection of the protective earth terminal will cause a potential shock hazard that might cause personal injury.

FUSES

Fuse must be changed by authorized Nemic-Lambda service personnel only. For continued protection against risk of fire, replace only with the same type and rating of fuse. Refer to maintenance instructions in chapter 6 for fuse rating.

INPUT RATINGS

Do not use AC supply which exceeds the input voltage and frequency rating of this instrument. The input voltage and frequency rating of the GP485A is; 100-240V~, 50/60Hz. For safety reasons, the mains supply voltage fluctuations should not exceed +/- 10% of nominal voltage.

LIVE CIRCUITS

Operating personnel must not remove the instrument cover. No internal adjustment or component replacement is allowed by non-Nemic-Lambda qualified service personnel. Never replace components with power cable connected. To avoid injuries, always disconnect power, discharge circuits and remove external voltage sources before touching components.

PART SUBSTITUTIONS AND MODIFICATIONS

Part substitutions and modifications are allowed by authorized Nemic-Lambda service personnel only. For repairs or modifications, the instrument must be returned to a Nemic-Lambda service facility.

ENVIRONMENTAL CONDITIONS

The GP485A series safety approval applies to the following operating conditions:

* Indoor use
* Maximum relative humidity: 90% (no dew drop)
* Pollution degree 2
* Ambient temperature: 0°C to 50°C
* Altitude: up to 3,000 m

SAFETY INSTRUCTIONS

SAFETY SYMBOLS

Instruction manual symbol. The instrument will be marked with this symbol when it is necessary for the user to refer to the instruction manual.

Indicates hazardous voltage.

Indicates ground terminal.

WARNING

The WARNING sign denotes a hazard. An attention to a procedure is called. Not following procedure correctly could result in personal injury.
A WARNING sign should not be skipped and all indicated conditions must be fully understood and met.

CAUTION

The CAUTION sign denotes a hazard. An attention to a procedure is called. Not following procedure correctly could result in damage to the equipment. Do not proceed beyond a CAUTION sign until all indicated conditions are fully understood and met.

FCC COMPLIANCE NOTICE:
Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

CHAPTER 1 GENERAL INFORMATION

1.1 USER'S MANUAL CONTENT

This user's manual contains the operating instructions, installation instructions and specifications of the GP485A. For information related to operation with the Zup Series, refer to Nemic-Lambda's Zup User's Manual.

1.2 INTRODUCTION

1.2.1 General description

The GP485A is a high performance GPIB-to-RS485 interface. It enables a computer with a GPIB port to communicate with up to 31 Zup power supplies via a single GP485A unit. The GP485A has all the software and logic required to implement the physical and electrical specifications of the IEEE488 and RS485 standards.

1.2.2 Configurations

The GP485A can be configured into a GPIB system of up to 14 controllers. Each controller can control up to 31 Zup units in dual GPIB addresses. One address to configure itself and one to communicate with the Zup units.

1.2.3 Control via the GPIB port

The following parameters can be programmed via the GPIB communication port:

1. GP485A configuration
2. Zup parameters (refer to Zup User's Manual Par. 1.2.3)

1.2.4 Input/Output connections

Connections of AC source, GPIB port and RS485 port are made to rear panel connectors.

AC input: IEC inlet
GPIB port: Standard 24 pin shielded champ female connector
RS485 port: RJ-45, shielded connector

1.3 ACCESSORIES

1.3.1 General

Accessories are delivered with the GP485A upon ordering. Below are listed possible accessories and ordering numbers:

ORDER#	DESCRIPTION
NL100	19" rack, 3U height
NL101	Blank panel for 19" rack
NL103	Additional User's Manual

1.3.2 Serial link cable

Serial link cable for linking the GP485A to the Zup units via RS485 communication is provided with each GP485. Cable description: 0.5m typ. length, shielded, RJ-45 type plugs, 8 contacts.

1.3.3 AC Cables

PART No.	MARKET	DESCRIPTION
NC301	USA	15A, 125V, unshielded, 2m typ. length, with IEC320 connector on one side and NEMA-5-15P connector on the other side.
NC302	EUROPE	10A, 250V, unshielded, 2m typ. length, with IEC320 connector on one side and INT'L standard VII, dual earthing on the other side.
NC303	GENERAL	10A, 250V, unshielded, 2m typ. length, with IEC320 connector on one side and unterminated striped wires on the other side. Use the cable only with plug approved by the national safety standards of the country of usage.

CHAPTER 2 SPECIFICATIONS

2.1 GP485A SPECIFICATIONS

1	Input Voltage / freq. (*1)	-	85~265Vac continuous, 47~63Hz
2	Input Current 100/200Vac	-	Less than 0.14A at 100V, 0.07A at 200V
3	Inrush Current 100/200Vac (*2)	A	15 / 30
4	IEEE488 capability	-	SH1, AH1, T6, TE0, L4, LE0, SR1, RL0, PP1, DC1, DT0, C0, E1, E2
6	Indications	-	LED's: Power / Ready, Talk, Listen, SRQ
7	Operating temp.	^{O}C	0~50
8	Storage temp.	^{O}C	- 20 ~70
9	Operating humidity	-	30~90% RH, no dew drop
10	Storage humidity	-	10~90% RH, no dew drop
11	Conducted emission	-	EN55022B, VCCI-B , FCC part 15 (class B)
12	Radiated emmision	-	EN55022B, VCCI-B , FCC part 15 (class B)
13	Weight	Kg	1.95
14	Size (W*H*D)	mm	70x124x350
15	Applicable safety standards	-	UL61010-1, EN61010-1
16	Applicable EMC standards	-	EN61326-1, IEC61326-1
17	Withstand voltage	-	Input-Output: 3KVac, Input-Chassis: 1.5KVac Output-Chassis: 500Vac
18	Leakage current	mA	Less than 1mA
19	Vibration (with mounting screws)	G	1~55Hz, Amp. (sweep 1 min) less than 2G, X, Y, Z 1hour each
20	Shock	G	Less than 20

Notes: * 1: For cases where conformance to various safety specs (UL, IEC etc.) are required, to be described as 100-240VAC, 50/60Hz on name plate.
* 2: At cold start. Ta = 25^{O}C.

2.2 SUPPLEMENTAL CHARACTERISTICS

The supplemental characteristics give typical but non-warranted performance characteristics. The supplemental characteristics are useful in accessing applications for the GPIB controller. Types of supplemental characteristics are listed below.

1. RELIABILITY DATA: Reliability performance of the controller.
2. EN61000 DATA: Performance of the controller under EN61000 test conditions.
3. EMI DATA: Typical EMI (Conducted and Radiated) performance of the controller.

The supplemetal characteristics data are held in each Nemic-Lambda sales and service facility. For further details, please contact the Nemic-Lambda representative nearest you.

CHAPTER 3 INSTALLATION AND CONFIGURATION

3.1 GENERAL

This chapter contains instructions for initial inspection, preparation for use and repackaging for shipment.
Connection to PC and Zup power supplies is described in Par. 3.7 ~ 3.11.

NOTE

GP485 generates a magnetic field which might affect the operation of other instruments. If your equipment is susceptible to magnetic fields, do not position adjacent to the GP485.

3.2 INITIAL INSPECTION

Prior to shipment the GP485A was inspected and found free of mechanical or electrical defects. Upon unpacking of the GP485A, inspect for any damage which may have occurred in transit. Keep all packing materials until inspection has been completed. If any damage is detected, file a claim with the carrier immediately and notify the Nemic-Lambda sales or service facility nearest you.

3.2.1 Mechanical inspection

The mechanical inspection should confirm that there is no exterior damage to the GP485A such as broken connectors and front panel are not scratched or cracked.

3.2.2 Preparation for use

In order to be operational, the GP485A must be connected to an appropriate AC source. The line voltage must be within the GP485A specification. DO NOT apply power before reading paragraph 3.2.3

3.2.3 AC Source requirements

The GP485A can be operated from a nominal 100V to 240V, single phase, 47 ~ 63Hz. The input voltage range and current required is specified in chapter 2. Make sure that the AC voltage does not fall below "low limit" specifications.

3.3 COOLING AND PLACEMENT

The GP485A should be used in an area where the ambient temperature does not exceed +50^{O}C. Do not install the GP485A adjacent to a hot surface or heat generating equipment.

3.4 RACK MOUNTING

GP485A can be mounted in a standard 19" rack (3U height) and occupy 1/6 rack length. The GP485A should be fixed by M4 screws replacing the rubber feet on the bottom of the GP485A. Screws must not protrude more than 6mm into the unit. Refer to the outline drawing in this chapter for mounting details.

3.5 REPACKAGING FOR SHIPMENT

To ensure safe transportation of the instrument, it is recommended to use the original package. The original packaging material is reusable. If the original package is not available, contact the Nemic-Lambda Sales or service facility near you for details on obtaining suitable packaging and shipping information. Please attach a tag to the GP485A unit describing the problem and specifying the owner, model number and serial number of the unit.

3.6 POWER CONNECTION

CAUTION

Connection of the GP485A to an AC source should
be made by an electrician or other qualified personnel.

The GP485A is equipped with a three conductor power cable. The third conductor is the ground conductor. When the cable is plugged-in to an appropriate receptacle, the GP485A is grounded. Under no circumstances should the GP485A be operated without an adequate ground connection. If a two contact receptacle is encountered, it must be replaced by a three contact receptacle, properly grounded. This operation should be done by a qualified electrician. It is recommended to keep the AC input wires separate from the communication cables to avoid interference.

WARNING

Some components inside the GP485A are at AC voltage even when the
On/Off switch is in the “Off” position. To avoid the hazard of electric shock,
disconnect line cord and wait 2 minutes before removing cover.

3.7 CONNECTING THE CABLES

WARNING

Turn off the AC input power before making or changing any rear panel connection.
Make sure that all connections are securely tightened before applying power.

3.7.1 RS485 cable

Connect one end of the serial communication cable to the RS485 OUT connector located on the GP485 rear panel. Connect the other end of the cable to the Zup power supply RS485/232 IN connector. Be sure to use only shielded cable, and follow the RS485 cabling restrictions.

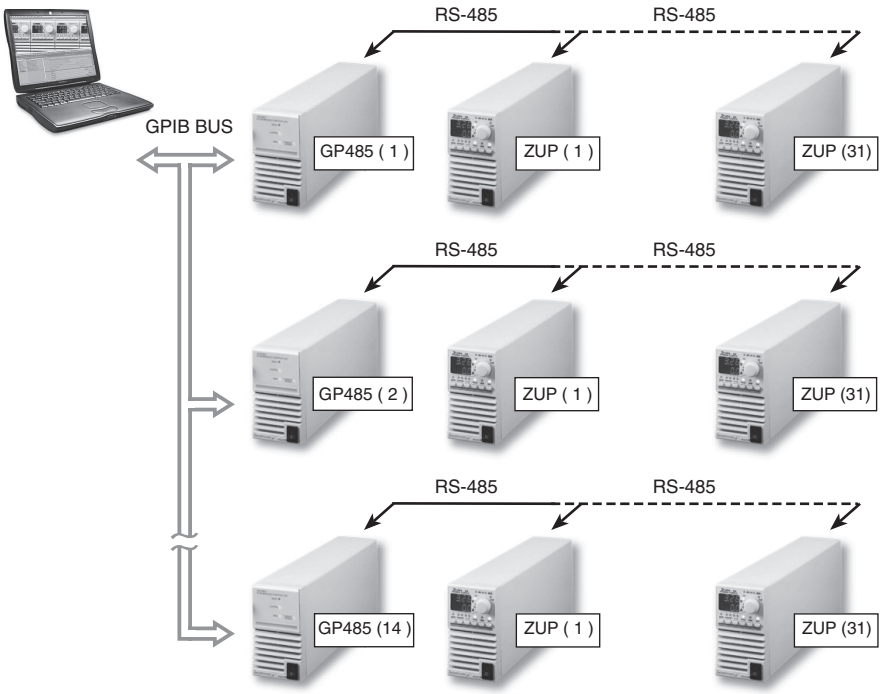
3.7.2 GPIB cable

Connect one end of the GPIB cable to the GPIB connector located on the GP485A rear panel and tighten the thumb screws on the connector. Connect the other end to the GPIB connector on the GPIB controller. Shielded or non-shielded GPIB cable may be used. When non-shielded cable is used, an EMI suppressor clamp should be attached to the cable, as close as possible to the GP485A (The EMI suppressor is included in the package).

3.7.3 AC cord

Connect the AC cord to the GP485 ac input connector located on the rear panel, then connect the plug to an ac outlet of the correct voltage as specified in the specifications in chapter 2.
To meet radiated EMI specification, the EMI suppressor clamp should be attached to the AC cable as close as possible to the AC inlet of the power supply.

3.8 CONNECTIONS IN A SYSTEM



* Controls up to 31 ZUP units through a single GPIB address.
* Conforms to all versions of the IEEE488
* 19" racking possibility.

Fig. 3-1: System connections

3.9 RS485 CONNECTOR PINOUT

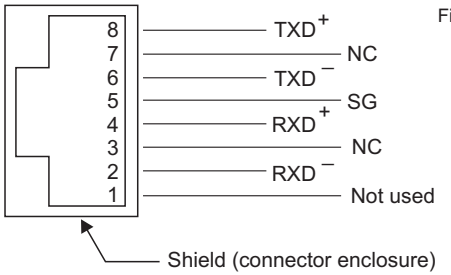
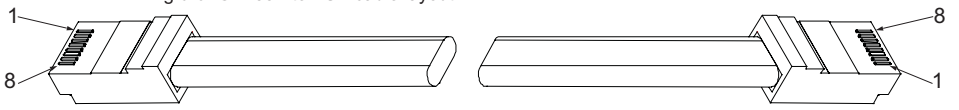
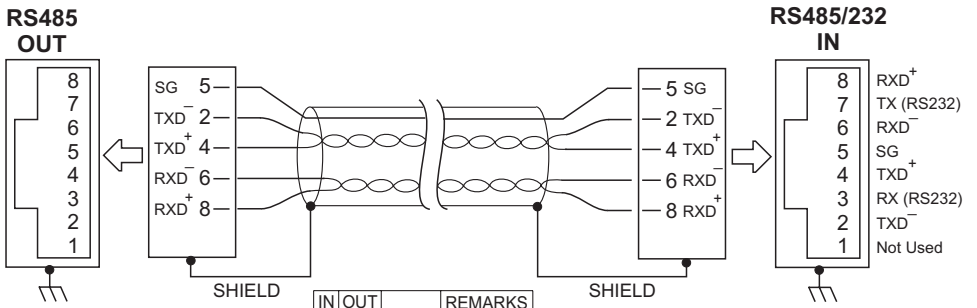


Fig. 3-2: The RS485 connector pinout
(view of GP485A rear panel)

3.10 CONNECTING GP485A TO ZUP POWER SUPPLY

Fig.3-3: GP485A to ZUP cable layout





IN	OUT		REMARKS
5	5	SG -	
2	2	TXD -	Twisted
4	4	TXD +	Pair
6	6	RXD -	Twisted
8	8	RXD +	Pair

Fig.3-4: Connecting GP485A to Zup power supply via RS485 cable.

3.11 THE GPIB CONNECTOR

The GPIB connector is a standard 24-pin shielded Champ female connector with metric screwlock hardware. Fig. 3-5 shows a diagram of the GPIB connector and the signals supported. The * suffix indicates that the signal is active low.

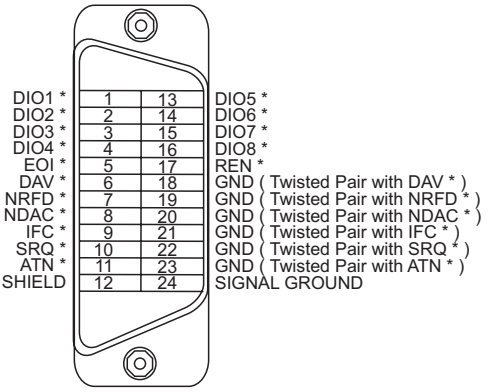

DIO1 * 1 13 DIO5 *
DIO2 * 2 14 DIO6 *
DIO3 * 3 15 DIO7 *
DIO4 * 4 16 DIO8 *
EOI * 5 17 REN *
DAV * 6 18 GND (Twisted Pair with DAV *)
NRFD * 7 19 GND (Twisted Pair with NRFD *)
NDAC * 8 20 GND (Twisted Pair with NDAC *)
IFC * 9 21 GND (Twisted Pair with IFC *)
SRQ * 10 22 GND (Twisted Pair with SRQ *)
ATN * 11 23 GND (Twisted Pair with ATN *)
SHIELD 12 24 SIGNAL GROUND

Fig. 3-5: The GPIB Connector and Signal Designations

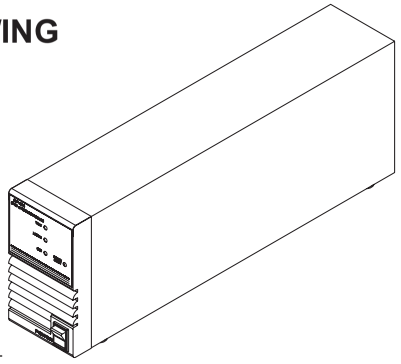
3.12 CONTROLLER DEFAULT CONFIGURATION

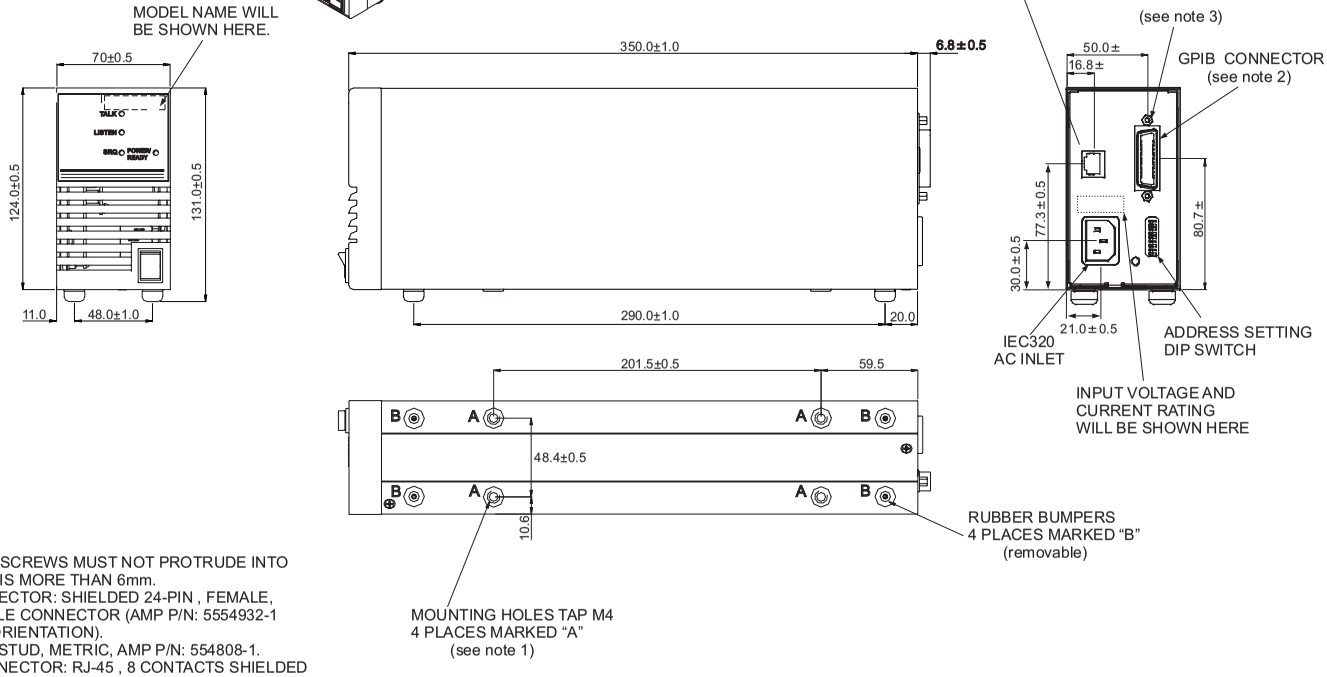
The GP485A power-up default setting is as follows:

GPIB address (the GP485A is shipped from Factory with address “1”)
8 data bits/character
1 stop bit/character
no parity
9600 baud rate

If you want to change any default settings, you must change the DIP switch settings or set it by software. To change the DIP switch, shut down the system and then refer to Par. 4.2.3. To change the serial port setting refer to table 5-5 , **sps** command.

3.13 OUTLINE DRAWING





NOTE :

1. MOUNTING SCREWS MUST NOT PROTRUDE INTO THE CHASSIS MORE THAN 6mm.
2. GPIB CONNECTOR: SHIELDED 24-PIN , FEMALE, RIGHT ANGLE CONNECTOR (AMP P/N: 5554932-1 REVERSE ORIENTATION).
3. STANDOFF STUD, METRIC, AMP P/N: 554808-1.
4. RS485 CONNECTOR: RJ-45 , 8 CONTACTS SHIELDED CONNECTOR.

CHAPTER 4 OPERATING INSTRUCTIONS

4.1 INTRODUCTION

This chapter describes the operating modes, controls and indicators of the GP485A controller. It also describes how to program the GP485A controller, status and error handling information, programming considerations, programming messages, function arguments, addressing, GPIB read and write termination methods, serial port transmissions and mode functions.

4.2 CONTROLS AND INDICATORS

4.2.1 Front panel

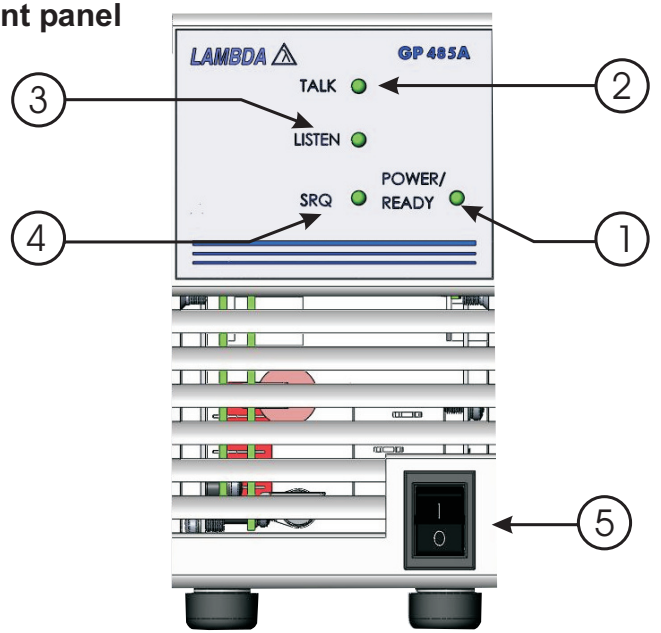


Fig. 4-1: Front panel controls and indicators

Table 4-1: Front panel controls and indicators

#	Control/Indicator	Indication
1	Power/Ready	Indicates that the power is “ON” . The unit is ready to operate once the LED illuminates.
2	Talk	Indicates that the GP485A is addressed as a GPIB Talker.
3	Listen	Indicates that the GP485A is addressed as a GPIB Listener.
4	SRQ	Indicates that the GP485A signal line SRQ is asserted.
5	AC ON/OFF	Turns AC power On and Off.

4.2.2 Rear Panel

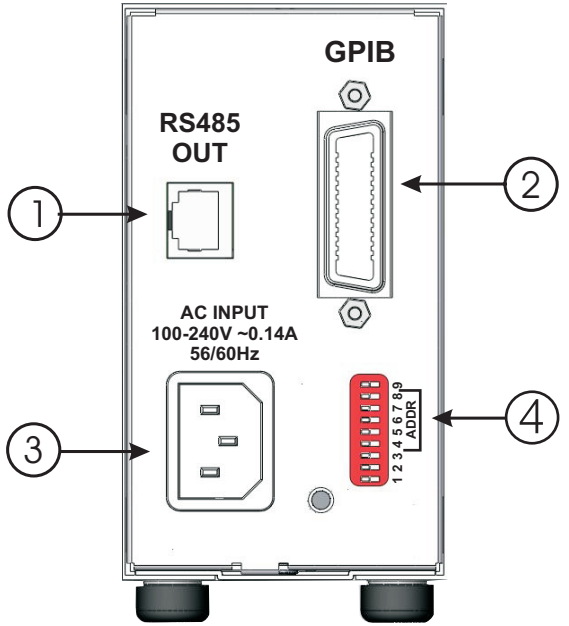


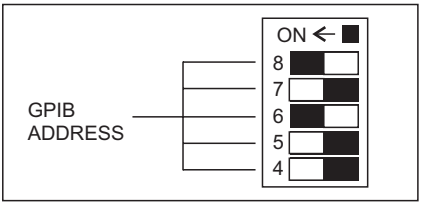
Fig. 4-2: Rear Panel Connections

Table 4-2: Rear Panel Connections and controls

#	Connector	Description	Par.
1	RS485 OUT	JR-45 shielded type connector, used for RS485 communication with Zup power supplies.	3.9 , 3.10
2	GPIB	Shielded 24-pin Champ female connector, with metric screwlock. Used for GPIB communication with the GPIB controller.	3.8 , 3.11
3	AC Input	IEC type appliance inlet.	3.2.3
4	Address select DIP switch	9 Position DIP switch. Positions 4 to 8 used for address selection.	4.2.3

4.2.3 Address setting

Switches 8 through 4 set the GPIB address of the GP485A. The serial device address is the GP485A GPIB address plus 1, refer also to par. 4.8. Before setting the address switches, find two consecutive addresses that are not used by any other GPIB devices in the system. In Figure 4-2, switches 8 to 4 are ON, OFF, ON, OFF and OFF respectively, indicating that the GP485 is at GPIB address 5 and the serial device is at GPIB address 6.



Note:
DIP switch position
1, 2, 3, 9 should be
in right position (Off).

Figure 4-2: sample of address setting (Rear panel view)

Table 4-3 shows the switch settings for the GP485A address and the corresponding serial device address.

Table 4-3: GPIB address switch settings for GP485A

Switches 8	7	6	5	4	GP485A Address	Serial Port Address
ON	OFF	OFF	OFF	OFF	1	2
OFF	ON	OFF	OFF	OFF	2	3
ON	ON	OFF	OFF	OFF	3	4
OFF	OFF	ON	OFF	OFF	4	5
ON	OFF	ON	OFF	OFF	5	6
OFF	ON	ON	OFF	OFF	6	7
ON	ON	ON	OFF	OFF	7	8
OFF	OFF	OFF	ON	OFF	8	9
ON	OFF	OFF	ON	OFF	9	10
OFF	ON	OFF	ON	OFF	10	11
ON	ON	OFF	ON	OFF	11	12
OFF	OFF	ON	ON	OFF	12	13
ON	OFF	ON	ON	OFF	13	14
OFF	ON	ON	ON	OFF	14	15
ON	ON	ON	ON	OFF	15	16
OFF	OFF	OFF	OFF	ON	16	17
ON	OFF	OFF	OFF	ON	17	18
OFF	ON	OFF	OFF	ON	18	19
ON	ON	OFF	OFF	ON	19	20
OFF	OFF	ON	OFF	ON	20	21
ON	OFF	ON	OFF	ON	21	22
OFF	ON	ON	OFF	ON	22	23
ON	ON	ON	OFF	ON	23	24
OFF	OFF	OFF	ON	ON	24	25
ON	OFF	OFF	ON	ON	25	26
OFF	ON	OFF	ON	ON	26	27
ON	ON	OFF	ON	ON	27	28
OFF	OFF	ON	ON	ON	28	29
ON	OFF	ON	ON	ON	29	30
OFF	ON	ON	ON	ON	30	0

Note:
To change the address,
the GP485A AC power
must be turned Off.

4.3 TURN-ON CHECKOUT PROCEDURE

4.3.1 General

The following procedure ensures that the GP485A controller is operational and may be used as a basic incoming inspection check.

4.3.2 Prior to operation

Check that the rear panel RS485 cable is connected as shown in Fig. 3-3. Connect the GPIB cable between the GP485A and the host computer. (Refer to Fig. 3-4 for GPIB connector description). Connect the GP485A to an AC source as described in paragraph 3.6.

4.3.3 Power on

Turn on the GP485A. Wait until the Power/Ready led illuminates.

Set the baud rate to same as the Z.UP power supply (see table 5-5 , **sps**et)

4.4 STATUS INFORMATION AND ERROR HANDLING CHARACTERISTIC

The functions description in Table 5-5 explains that the GP485A records specific status and error information. This means that it stores that information in it's memory so that it is available when requested by the user. The functions description also include an explanation on return of information to the user from the GP485A. This is accomplished by information sent to the user from the GP485A over the GPIB.

The GP485A continuously monitors the serial port for transmission errors. If an error is encountered in the serial data, the GP485A records the error. The GP485A can be programmed to ignore serial port errors using the **spi**gn function.

4.5 PROGRAMMING CONSIDERATIONS

- The program examples within the functions description are written in Microsoft QuickBASIC Version 4.5, using National Instruments NI-488.2 function calls. Although the examples in this manual are written in BASIC. The GP485A can be programmed using any language that has access to a GPIB port.

- The following NI-488.2 function call addresses the GP485A to listen and sends it the programming message **sps**et, followed by a carriage return.

```
WRT$="SPSET"+CHR$(13)
CALL IBWRT(GP485A% , WRT$)
```

If not using the National Instruments NI-488.2 software, be sure your program properly addresses the GP485A and the serial device when writing to and reading from them.

- In the function syntax descriptions, arguments shown in square brackets ([ ]) are optional. Do not enter the brackets as part of the argument.

- Function name abbreviations can be used, which include as many characters as necessary to distinguish them from other functions. The abbreviated forms are indicated by **bold** text in the syntax description of each function.

4.6 PROGRAMMING MESSAGE FORMAT

You can program the GP485A by sending it programming messages, which are ASCII strings, via it's GPIB port. Each programming message is terminated with a carriage return (<CR>), a linefeed (<LF>), or a carriage return followed by a linefeed (<CR><LF>). This is denoted by <CR> in the syntax portions of the function descriptions and by CHR$(13) in the BASIC examples.
Programming messages can be entered in any combination of uppercase and lowercase letters.

4.6.1 Programming message example

The following lines of code are an example of a programming message in BASIC:

```
WRT$ ="eos x,b,10"+CHR$(13)
CALL IBWRT(GP485A% , WRT$)
```

The programming message WRT$ contains **eos**, which is the function name, x and 10 are the arguments, and CHR$ is the terminating carriage return. This programming message tells the GP485A to assert the **EOI*** line when it sends the end-of-string character linefeed. The second line of the example is a NI-488.2 function call that allows a personal computer to control the GPIB from Microsoft BASIC. This function outputs the string in WRT$ to the GP485A.

4.6.2 How messages are processed

The GP485A processes each programming message on a line-by-line basis. When the GP485A receives a message, it buffers the message, interprets the function name and arguments, then executes the message.

4.7 FUNCTION ARGUMENTS

When typing in a function, separate the first argument from the function name with at least one space. Separate each additional argument with at least one space or a comma. In the syntax portions of the function descriptions in Table 5-5, the square brackets ([ ]) that enclosed some arguments indicate that those arguments are optional. Do not enter the brackets as part of the argument.

4.7.1 Abbreviations for arguments

The term bool is an abbreviation used for an argument in the functions description.
The values for bool are:
1 = true, on or enable
0 = false, off or disable

4.8 ADDRESSING THE GP485A AND SERIAL PORT

The GP485A uses dual addressing to determine what type of GPIB data is being processed. With dual addressing, the GP485A recognizes two different GPIB addresses. The first address is the GP485A address. When the GP485A receives it's own address, the data received is referred to as programming messages; the data it sends is referred to as status information. The second address is the serial port address. When the GP485A receives the serial port address, the data it sends and receives is referred to as serial data.

4.8.1 Address of the GP485A

The address of the GP485A is the primary address set with the DIP switch on the rear panel. Par. 4.2.3, with the secondary addressing disabled.

4.8.2 Address of the serial port

The address of the serial port is the GP485A address plus 1, with the secondary addressing disabled. However, if primary address of 30 with the configuration switch is selected, the serial port is at 0. The primary address is set with the DIP switch on the rear panel, refer to Par. 4.2.3.

4.8.3 Addressing the GP485A and serial device as listeners

When the GP485A receives it's own listen address, it examines the data received over the GPIB, treats it as a programming message, and takes action based on that data. When the GP485A receives the serial device listen address, it forwards the data over the GPIB to the serial port without examining or modifying the data. For example: to send a command from user's computer over the GPIB to the power supply. Before sending the command to the serial port, the GP485A must be configured to the suitable serial port parameters.

Follow these steps to send a command from a computer to a Zup power supply connected to the serial port :

1. Address the GP485A to listen by sending it's listen address.
2. Send the programming message "sps 9600 n 8 1 " to the GP485A. The GP485A interprets this programming message and acts upon it without sending any data on to the serial device.
3. Address the serial port to listen by sending the serial device listen address to the GP485A.
4. Send the command over the GPIB. The GP485A sends the command to the power supply without examining it for meaning.

The LISTEN LED on the GP485A is lit when either the GP485A or the serial device is addressed to

4.8.4 Addressing the GP485A and serial device as talkers

When the GP485A receives it's own talk address, it sends out status information. When the GP485A receives the serial device talk address, it sends data out to the GPIB that it has received from the serial device. For example: User requests power supply to return status information.

Follow the following steps to retrieve the data:

1. Address the serial power supply to talk by sending the serial device talk address to the GP485A. If the GP485A receives the serial device talk address, but has no data in it's serial port receive buffer to send it waits for data from the serial power supply to fill the request.
2. Perform a GPIB read of 100 bytes. The GP485A retrieves 100 bytes from it's serial port receive buffer and sends them to the user.
3. Find out if the serial power supply has sent more bytes to the GP485A by asking the GP485A to send status information.
   a. Send the GP485A it's listen address.
   b. Send the programming message **st**at n to the GP485A.
   c. Send the GP485A it's talk address.
   d. Perform a GPIB read of 20 bytes. The GP485A sends it's status information, terminated by the GPIB END message. If the GP485A receives it's talk address but has nothing to send, it responds to GPIB reads with a carriage return and a linefeed, accompanied by END.

The status information returned contains the number of bytes remaining in the serial port receive buffer. This information helps the user to decide how much data to continue to collect from the serial device. The TALK LED on the GP485A is lit when either the GP485A or the serial power supply is addressed to talk.

4.9 GPIB READ AND WRITE TERMINATION METHODS (END and EOS)

The IEEE 488 specification defines two ways that GPIB Talkers and Listeners can identify the last byte of data messages: END and EOS. The two methods permit a Talker to send data massages of any length without the Listener(s) knowing the number of transmission bytes in advance. END and EOS can be used individually or in combination, but the Listener must be configured to detect the end of transmission.

END message: The Talker asserts the **EOI*** (End or Identify) signal while the last data byte is being transmitted. The Listener stops reading when it detects a data byte accompanied by **EOI***, regardless of the value of the byte.

EOS character: The Talker transmits an EOS (end-of-string) character at the end of it's data string. The Listener stops receiving data when it detects the EOS character. Either a 7-bit ASCII character or a full 8-bit binary byte can be used.

When the GP485A receives it's own talk or listen address, no EOS modes are in effect. When talking, the GP485A asserts **EOI*** with the last byte of it's response. When the GP485A receives the serial device talk address, the EOS modes in effect are those that the user selects using the **eos** function.

4.10 SERIAL PORT TRANSMISSION

The GP485A checks the data received from the serial device for errors while it buffers data. If a serial port error occurs, The GP485A records the appropriate error code. There are two ways to determine if a serial port error has occurred:

* Use the **st**at function to request the GP485A status information. After the serial error code has been reported, it is automatically cleared and no further action to the GP485A is necessary.
* Serial poll the GP485A and check the serial poll response byte to see if it's SERR bit is set. Refer to Par. 4.12 later in this chapter.

Program the GP485A to ignore serial port errors using the **spi**gn function.

4.11 OPERATION OF THE GP485A AS A GPIB DEVICE

The GP485A operates like any other GPIB device and, as such, is configured to respond in certain ways to GPIB commands.

4.12 SERIAL POLL RESPONSES

When serial polled, the GP485A returns status information to the GPIB controller through the serial poll response byte. The GP485A maintains this status byte throughout operation, regardless of the **srq**en configuration. Table 4-4 lists the meaning of each bit in the serial poll response byte.

Table 4-4: Serial port response byte

Bit	Mnemonic	Meaning
0	-	Not used
1	BF	Serial port receive buffer is full and serial device not addressed to talk.
2	GERR	GPIB error - see **st**at Table 5-5
3	SERR	Serial error - see **st**at Table 5-5
4	BNE	Serial port receive buffer not empty and serial device not addressed to talk.
5	EOS	EOS character received and serial device not addressed to talk.
6	RQS	Request service (**SRQ*** asserted)
7	-	Not used

4.13 SERVICE REQUEST (SRQ)

4.13.1Service Request at Power On

After Power On , the GP485A defaults to never asserting service request. Using the **srq**en function , the GP485A can be programmed to assert **SRQ*** under a variety of cases.

4.13.2 SRQ* conditions

The GP485A will assert **SRQ*** in a variety of cases related to the operation of the GP485A itself and also to the operation of the Zup units connected to the GP485A serial port.

4.13.3 SRQ* generation by the GP485A

The GP485A will assert **SRQ*** under any of the following circumstances :

1. When a GPIB error occurs , that is EARG , ECMD or ECAP as reported by **st**at.
2. When a serial port error occurs , that is , EPAR , EORN , EOFL or EFMR as reported by **st**at.
3. When the serial device is not addressed as a talker and sends a message to the GP485A.

4.13.4 SRQ* generation by Zup Power Supply

A Zup Power Supply will send a string message in the event of Foldback Protection activation, Over Voltage Protection or Over Temperature Protection .For more details about the **SRQ** commands and queries , refer to Zup User's Manual.
The Zup Power Supply will send the message when it is not addressed as a talker and thus will cause the GP485A to assert **SRQ***. The message consists of three characters and terminated with <CR><LF>.
The first character identifies the SRQ cause : 1-Foldback, 2-OVP, 3-OTP.
The 2nd and 3rd characters identify the Power Supply address.
The Zup Power Supply will be not addressed as a talker if the last command is operational command or DCL.

Example :

String generated by a Zup unit : 120<CR><LF> , means foldback protection was activated in power supply address 20.

The **SRQ*** can be identified by serial or parallel poll. Refer to par. 4.12 and 4.14 for details. If using serial

Table 4-5: serial poll response.

Bit	Decimal	Mnemonic	Description
4	16	BNE	Serial port receive buffer not empty and serial device not addressed to talk.
5	32	EOS	EOS character received and serial device not addressed to talk.
6	64	RQS	Request service (SRQ*) asserted.

4.13.5 GP485A initialize for using SRQ*

```
WRT$= “srq 16”+CHR$(13)          ‘enable to assert SRQ* if the GP485A serial buffer not empty
CALL IBWRT(GP485A%, WRT$)        ‘and the serial device not addressed to talk
```

4.14 PARALLEL POLL

The GP485A sets the ist (individual status) bit whenever it asserts **SRQ*** and clears ist whenever it unasserts **SRQ***. The GP485A implements IEEE 488 Parallel Poll (PP) interface function subset PP1. This means it cannot configure itself to respond to parallel polls. It must be configured remotely by an external Controller.

4.14.1 Take Control (TCT)

This command has no effect on the GP485A. It would not make sense for control to pass to the GP485A, since all programming messages and GPIB commands must be sent to it from another GPIB device.

4.14.2 Group Execute Trigger (GET)

This command has no effect on the GP485A.

4.14.3 Go To Local (GTL)

This command has no effect on the GP485A.

4.14.4 Device Clear

When the GP485A receives the universal Device Clear (DCL) command or when it receives It’s listen address and the Selected Device Clear (SDC) command, it clears both it’s status buffer and it’s serial port receive buffer. It also resets the GPIB serial poll response byte to zero and unasserts **SRQ***.

CHAPTER 5 FUNCTIONS AND COMMANDS

5.1 INTRODUCTION

This chapter contains descriptions of the mode functions that can be used to program the GP485. These functions are in alphabetical order for easy reference, order by group and explanations how to use.

5.2 FUNCTION NAMES

The function names have been selected to indicate the purpose of each function, thereby making programs easy to understand. However, if user's prefer to reduce some overhead in the program and do not mind giving up these advantages, use only as much of the function name as is necessary to distinguish it from other functions. This abbreviated form of the function name is shown in **bold** text in the function tables and in the syntax portions of the function descriptions.

5.2.1 Default settings and related functions

Tables 5-1 and 5-2, list power-on characteristics of the GP485A and the functions that can be used to change those characteristics.

Table 5-1: Serial Port Characteristics

Characteristic	Power-on value	Related function
Echo bytes to serial port	No	**ec**ho
Enable serial port communication	Yes	**o**nl
Baud rate	9600	**sps**et
Parity	None	**sps**et
Bits	8	**sps**et
Stop bits	1	**sps**et
Send XON/XOFF	No	**x**on
Recognize XON/XOFF	No	**x**on
Report serial errors	No	**spi**gn

Table 5-2: GPIB Characteristics

Characteristic	Power-on value	Related function
End-of-string modes	X,B,10	**eos**
Allow GP485A to assert SRQ	No	**srq**en

5.2.2 List of functions by group

The GP485A functions are divided into three groups: GPIB functions, serial port functions and general use functions. These groups are defined in Table 5-3.

Table 5-3: Functions by group

General functions	GPIB functions	Serial port functions
onl	**eos**	**ec**ho
stat	**srq**en	**sps**et
id		**x**on
***IDN**?		**spi**gn

5.2.3 Alphabetical function list

Table 5-4 separates the function in alphabetical order.

Table 5-4: Alphabetical function list

echo on/off	Echo characters received from serial port
eos modes, eoschar	Change or disable GPIB end-of-string termination mode
onl on/off	Place the GP485A serial port online/offline
spign on/off	Ignore serial port errors
spset modes	Change serial port parameters
srqen mask	Set conditions for asserting SRQ
stat options	Return GP485A status
xon modes	Change serial port Xon/Xoff protocol
id or ***IDN?**	Identify system

5.3 COMMAND FUNCTION SYNTAX

id<CR> or ***IDN**?<CR>	For **id**, the identification message is returned in three strings. The first string identifies the software name. The second string identifies the revision level. The third string identifies the company. For the ***IDN**?, the identification message is returned in one string. Example: "GPIB485A, Rev0.1, Lambda"
echo [bool]<**CR**>	Use in a debugging environment, when a terminal is connected to the GP485A instead of serial device. Data that the GP485A would send to the power-supply is displayed on the terminal screen. User can also write characters on the terminal to send to the GP485A. bool= 0 echo off 1 echo on * call echo without argument, returns it's current status. * echo is disabled by default. * echo remains in effect until echo called again, call **o**nl or turn off the GP485A. Example: 1. WRT$="echo 1"+CHR$(13) 'Enable character CALL IBWRT(GP485A%, WRT$) 'echoing 2. WRT$="echo"+CHR$(13) 'What is the current status? CALL IBWRT(GP485A%, WRT$) 'RESP$ contains 1<CR><LF> CALL IBRD(GP485A%, RESP$)
eos [X[B]eoschar]<**CR**>	Use **eos** to enable the GP485A to assert **EOI*** and add GPIB END message to the data string sent by the serial device when the string contains the specified end-of-string character. **eos** applies only when the GP485A has received the serial power-supply talk address and is sending serial data to the GPIB. X,B - set **EOI*** with eos (XEOS) and compare all 8 bits of EOS bytes (BIN) when sending data from the power-supply. D - EOS mode disable. * EOS mode is enabled by default. * call **eos** without an argument returns it's current status. * The assignment made by this function remains in effect until **eos** called again, call **o**nl or turn off the GP485A. Example: 1. WRT$="EOS X,B,10"+CHR$(13) 'send EOI with <CR> CALL IBWRT(GP485A%, WRT$) 'compare 8 bit 2. WRT$="eos"+CHR$(13) 'What is the current status? CALL IBWRT(GP485A%, WRT$) CALL IBRD(GP485A%, RESP$) 'RESP$ contains 'X,B,10<CR><LF> Note: The Zup power supply series default termination is <LF> therefore Example1 should be performed at each power-on of the GP485A.

Table 5-5: functions syntax

Table 5-5: functions syntax contd.

onl [bool]<**CR**>	Use **o**nl to disable communications between GP485A and serial port or to reset the GP485A characteristic to it's default values. Placing the GP485A offline is like disconnecting it's serial cable from the serial device. bool= 0 offline 1 online * GP485A is online by default * Call onl without an argument returns it's current status Example: 1. WRT$="onl 1"+CHR$(13) 'Puts GP485A online CALL IBWRT(GP485A%, WRT$) 'and restores power-up values 2. WRT$="ONL 0"+CHR$(13) 'Puts GP485A offline CALL IBWRT(GP485A%, WRT$)
spign [bool]<**CR**>	Use to ignore or not ignore the occurrence of serial port errors. If not to ignore the GP485A does not store characters that contain serial errors. Also, the error is indicated in the serial error code that is returned by the **st**at function. If to ignore, the GP485A stores serial port errors in the buffer which are later sent out of the GPIB port when the serial device is talk addressed. No error serial code is reported by **st**at function. By default, the GP485A ignores serial port errors. The serial port errors include parity, overrun, framing and overflow errors. bool= 0 don't ignore serial port errors 1 ignore serial port errors * Call **spi**gn without an argument, the GP485A returns the current seting. * **spi**gn remains in effect until **spi**gn called again, call **o**nl or turn off GP485A. Example: 1. WRT$="spign 0"+CHR$(13) 'Do not ignore CALL IBWRT(GP485A%,WRT$) 'Serial port errors 2. WRT$="spign 1"+CHR$(13) 'Ignore serial port CALL IBWRT(GP485A%, WRT$) 'errors
spset [baud] [parity] [databits] [stopbits]<**CR**>	Use **sps**et at the beginning of the program to set the GP485A serial port characteristics (baud rate, parity, data bits and stop bits) to match the Zup power supply. Possible values: baud [bits/s]: 300, 600, 1200, 2400, 4800, 9600 parity: n = none, e = even, o = odd data bits [b/c]: 7,8 stop bits: 1,2 * default values: 9600 n 8 1. * **sps**et without an argument returns it's current serial port configuration. * **sps**et remains in effect until **sps**et is called again, call **o**nl or turn off GP485A. Example: 1. WRT$="spset 1200 n 8 1" +CHR$(13) 'Set the serial port use 1200b/s, CALL IBWRT(GP485A%,WRT$) 'no parity, 8 data bits and 1 stop bit. 2. WRT$="spset"+CHR$(13) 'What are current serial CALL IBWRT(GP485A%, WRT$) 'port settings CALL IBRD(GP485A%,RESP$) 'RESP$ will contain '1200 n 8 1<CR><LF> Note: The Zup power supply series data format is no parity, 8 data bits and one stop bit, therefore the user needs to set only the baud rate.

Table 5-5: functions syntax contd.

srqen [mask]<**CR**>

Use **srq**en to allow the GP485A to assert **SRQ*** under the conditions described in Table 5-5-1.

mask= 0 never assert **SRQ***

>0 assert **SRQ*** according to Table 5-5-1

Table 5-5-1: SRQ mask bits

Bit	Hex Value	Decimal Value	Mnemonic	Description
0	1	1	-	Not used
1	2	2	BF	Serial port receive buffer full and serial device not addressed to talk
2	4	4	GERR	GPIB error - (see **st**at)
3	8	8	SERR	Serial error - (see **st**at)
4	10	16	BNE	Serial port receive buffer not empty and serial device not addressed to talk
5	20	32	EOS	EOS character received and serial device not addressed to talk
6	40	64	-	Not used
7	80	128	-	Not used

To determine the mask value, add up the hex or decimal values of each condition of which **SRQ*** is to be asserted.

Example: for asserting **SRQ*** on GPIB errors and serial port errors mask=12 (4 for GERR and 8 for SERR).

* **srq**en mode is disabled by default - **SRQ*** never asserted.

* call **srq**en without an argument returns a decimal string that indicates the current setting.

* **srq**en remains in effect until **srq**en called again, call **o**nl or turn off GP485A.

Example:

```
1. WRT$="srqen 0"+CHR$(13)          'Never assert SRQ*
   CALL IBWRT(GP485A%, WRT$)
2. WRT$="srqen 4"+CHR$(13)          'Asserts SRQ* when a
   CALL IBWRT(GP485A%, WRT$)        'GPIB error occurs.
```

stat [[c] n]<**CR**>
or
stat [c] s<**CR**>
or
stat [c] n s<**CR**>

Use **st**at to obtain the status of the GP485A to see if certain conditions are currently present. **st**at is used to see if the previous operation resulted in an error.

n - Returned status information as numeric string.
s - Returned status information in symbolic format (mnemonic string).
c - Returns status information after each programming message eliminating the need to call **st**at after each programming message.

* Call **st**at without an argument, continuous status reporting is disabled.

* When calling **st**at with both n and s modes specified, the numeric status is always returned first.

* The **st**at contains four pieces of information: GP485A status, GPIB error code, serial error code and a count which indicates the number of bytes currently contained in the GP485A serial port receive buffer. The GP485A returns a <CR><LF> following each piece of the response and asserts **EOI*** with the final <LF> that comes after count.

Table 5-5: functions syntax contd.

Status represents a combination of GP485A conditions. Inside the GP485A, status is stored as a 16-bit integer. Each bit in the integer represents a single condition. A bit value of 1 indicates the corresponding condition is in effect. A bit value of 0 indicates the condition is not in effect. Because more than one GP485A condition can exist at one time, more than one bit can be set in status. The highest order bit of status, also called the sign bit, is set when the GP485A detects either a GPIB error or a serial port error. when status is negative, an error condition exists.

Table 5-5-2 lists the values and descriptions of GPIB status conditions that might be returned by the **st**at function.

Table 5-5-2: GP485A conditions returned by **st**at

Numeric Value (n)	Symbolic Value (s)	Description	Bit
-32768	ERR	Error detected	15
16384	-	Reserved	14
8192	-	Reserved	13
4096	-	Reserved	12
2048	-	Reserved	11
1024	-	Reserved	10
512	-	Reserved	9
256	CMPL	Operation completed	8
128	-	Reserved	7
64	-	Reserved	6
32	-	Reserved	5
16	-	Reserved	4
8	-	Reserved	3
4	-	Reserved	2
2	-	Reserved	1
1	-	Reserved	0

Table 5-5-3 lists the values and descriptions of GPIB error conditions that might be returned by **st**at. Table 5-5-4 lists the serial port errors that might be returned by **st**at.

Table 5-5-3: GPIB error conditions returned by **st**at

Numeric Value (n)	Symbolic Value (s)	Description
0	NGER	No GPIB error condition to report
1	-	Reserved
2	-	Reserved
3	-	Reserved
4	EARG	Invalid argument or arguments
5	-	Reserved
6	-	Reserved
7 - 10	-	Reserved
11	ECAP	No capability for operation
12 - 16	-	Reserved
17	ECMD	Unrecognized command

Table 5-5: functions syntax contd.

Table 5-5-4: Serial port error conditions returned by **st**at

Numeric Value (n)	Symbolic Value (s)	Description
0	NSER	No serial port error condition to report
1	EPAR	Serial port parity error
2	EORN	Serial port overrun error
3	EOFL	Serial port receive buffer overflow
4	EFRM	Serial port framing error

Example:

```
10  'Turn on continuous status reporting ,
20  'in numeric format.
30   WRT$="stat c n"+CHR$ (13)
40   CALL IBWRT (GP485A%,WRT$)
50  'If we have 3 bytes in the serial port
60  'buffer, a typical response would be:
70  '256<CR><LF>0<CR><LF>0<CR><LF>3<CR><LF>
80  'Read the GP485A status; read 30
90  'bytes or until EOI is received.
100  RD$=SPACE$(30)
110  CALL IBRD(GP485A%,RD$)
120 'Print the status information.
130  Print "GP485A status is: ";RD$
```

CHAPTER 6 MAINTENANCE

6.1 INTRODUCTION

This chapter contains maintenance information for the GP485A model.

6.2 UNITS UNDER WARRANTY

Units requiring repair during the warranty period should be returned to a Nemic-Lambda authorized service facility. Refer to the address listing on the back cover of this user's manual. Unauthorized repairs performed by other than authorized service facilities may void the warranty.

6.3 PERIODIC MAINTENANCE

No routine maintenance of the GP485A is required except for periodic cleaning. To clean, disconnect the unit from the AC supply and allow 30sec for discharging internal voltage. The front panel and the metal surfaces should be cleaned using a dry cloth. Use low pressure compressed air to blow dust from the unit.

6.4 ADJUSTMENT AND CALIBRATION

No internal adjustment or calibration are required. Units that are returned for service will be calibrated at the service facility. There is NO REASON to open the GP485A cover.

6.5 PART REPLACEMENT AND REPAIRS

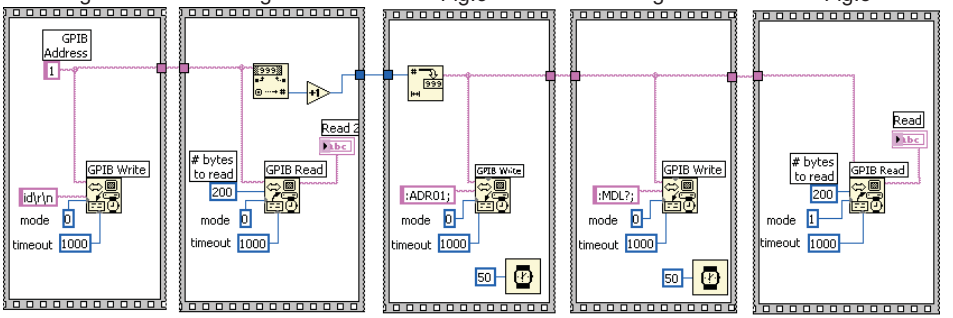
As repairs are made only by the manufacturer of authorized service facilities, no part replacement information will be discussed here. In case of failure, unusual or erratic operation of the unit, contact a Nemic-Lambda sales or service facility nearest you. Please refer to the Nemic-Lambda sales offices listed on the back cover of this user's manual.

6.6 FUSE RATINGS

Littelfuse Inc. type 215 series: rated 250V 2A.

6.7 Example of program written in Labview:

Fig.1 Fig.2 Fig.3 Fig.4 Fig.5



Primary Address	Fig.1	Write GP485A identification command
	Fig.2	Read GP485A identification replay
Secondary Address	Fig.3	Write ZUP address command
	Fig.4	Write ZUP identification command
	Fig.5	Read ZUP identification replay

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